THE MARKET FOR MACADAMIA KERNELS

Market Survey #07

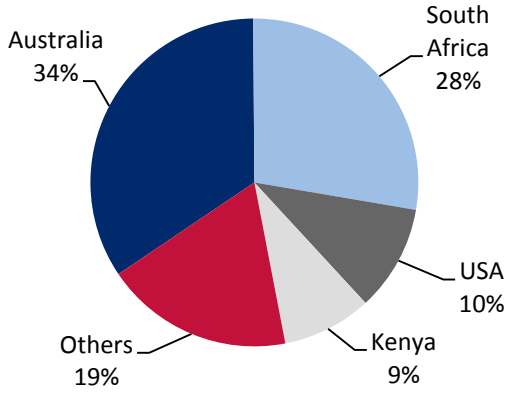
INTRODUCTION

The macadamia are considered to be among the finest table nuts in the world and are the only Australian plant to have been developed as an international food commodity. Commercial production is almost exclusively of the smooth shell variety (*Macadamia integrifolia*) owing to its consistent oil and sugar content, as well as its superior color, texture, and flavor. Although native to southeastern Queensland, *M. integrifolia* was initially developed as a horticultural crop in Hawaii during the 1930s. By the mid-1970s, the island chain accounted for over 90 percent of the world's supply. In the decades that followed, production expanded into Africa, South America, and Central America. Today, the nuts are primarily consumed as roasted, salted snack foods, chocolate-coated confectioneries, ingredients in bakery and ice-cream, or as edible oils.

PRODUCTION

Macadamias are composed of an inner kernel, encased by a thick and woody outer *testa* (shell) and a fibrous outer *pericarp* (husk). Production data are given for both in-shell (i.e. dehusked) and kernel (i.e. dehusked and shelled) forms. According to the International Nut and Dried Fruit Council (INC), macadamias are primarily produced in Australia, South Africa, the United States, and Kenya, with Guatemala, Malawi, Brazil, Mexico, Costa Rica, and Zimbabwe as secondary producers. From 2006-2011, world kernel production of macadamias rose from 28,040 metric tons (MTs) to 30,583 MTs, a 9% increase. South Africa and Kenya were major drivers of the increase with both countries recording a 90% and 32% growth in production over the six-year period primarily due to increased demand from Asia, respectively. Australia and the US saw negative growth with a 14% and 42% drop in production due partly to poor weather conditions. As a group, the secondary producers recorded a 49% increase in kernel production over the same period.

Figure 1: Kernel Macadamia Production Share by Volume, 2011



Source: INC

Total: 30,583 MTs

MARKETS

Macadamia imports and exports are primarily tracked as kernels[1] (as opposed to in-shell). In 2010, the largest importers of macadamias (kernel) were China (7,459 MTs), US (7,265 MTs), European Union (5,892 MTs), Vietnam (2,514 MTs), and Japan (2,374 MTs) (INC, USDA-GATS, Eurostat). From 2006-2010, the US and EU were the most stable markets for kernels, but both saw their global import share by volume drop (US 37 to 24% and EU 24 to 19%). This decline is primarily due to the ascent of China, which saw its global import share jump from 5 to 24% over the same period. Elsewhere in Asia, Japan witnessed an import share decline of 13 to 8%, while Vietnam and South Korea accounted for 8% and 1% of all imports in 2010, respectively.

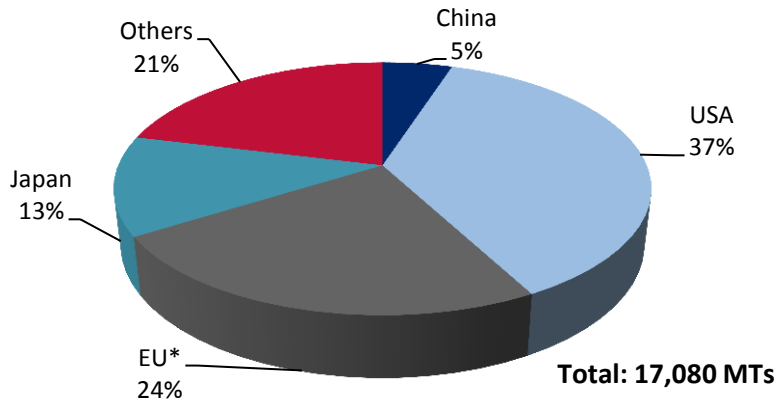
[1] Eurostat does not differentiate between kernel and in-shell, but primarily imports kernels (Public Ledger 2011). The INC only tracks kernel imports and does not record in-shell trade. In 2010, 96% of all US macadamia imports were in kernel form in terms of volume (USDA - Global Agricultural Trade System).

Taken as a whole, Chinese, US, and EU kernel imports accounted for 67% of global import share volume in 2010. **China** is of particular importance as the country surpassed both the US and EU in 2010 as the number one importer of kernels. According to an international "Macadamia Work Group" that met in Beijing in 2010, China is an important growth market for both processed kernels and in-shell macadamias. Unlike the US, where kernels are predominantly imported, Chinese in-shell imports comprised 59% or 18,398 MTs, of macadamia imports in 2010. According the Chinese representative of the working group, kernels are primarily consumed in eastern China, while in-shell macadamias are primarily consumed in central and western China. In response to strong domestic demand, China is expanding its cultivation of macadamias. However, China still lacks agricultural know-how and suitable varieties for to their region.

The **US** import market has been declining over the past few years. According to USDA's Global Agricultural Trade System (GATS), from 2005 to 2010, US import volumes of macadamias (kernel) decreased from 7,575 MTs to 7,265 MTs and equivalent values also declined from US$86.2 million to US$72.2 million.

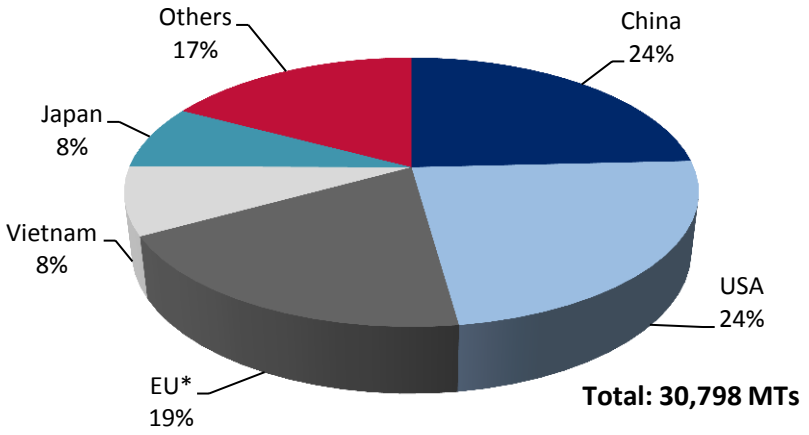
Over the same period, the **EU** import market increased from 4,661 MTs to 5,892 MTs, with equivalent values rising from US$59.3 million to US$63.3 million. Despite this growth, the EU's overall share of the global import market declined due to the previously mentioned rise of China.

Figure 2: World Imports of Macadamias (Kernels) Share by Volume, 2006



*Source: INC, USDA-GATS, Eurostat (*EU data contains in-shell imports)*

Figure 3: World Imports of Macadamias (Kernels) Share by Volume, 2010



*Source: INC, USDA-GATS, Eurostat (*EU data contains in-shell imports)*

Table 1: US Imports of Macadamias (Kernel)

Suppliers	2005		2006		2007		2008		2009		2010	
	MTs	$000s	MTs	$000s	MTs	$000s	MTs	$000s	MTs	$000s	MTs	$000s
South Africa	1,760	$20,478	1,444	$12,718	1,710	$9,705	1,990	$11,374	2,185	$13,017	2,336	$22,634
Kenya	578	$7,342	660	$5,640	581	$3,217	749	$4,178	629	$4,109	1,498	$16,505
Australia	1,971	$22,635	1,573	$14,677	1,761	$11,884	1,820	$12,354	1,737	$12,310	1,397	$12,373
Guatemala	843	$8,571	1,017	$10,512	989	$8,480	743	$7,990	940	$10,151	849	$9,449
Malawi	511	$5,853	212	$1,629	144	$793	509	$3,137	383	$2,332	613	$5,759
Others	1,912	$21,339	1,439	$14,290	1,472	$10,031	978	$6,380	996	$7,678	573	$5,468
Total	**7,575**	**$86,218**	**6,345**	**$59,466**	**6,656**	**$44,109**	**6,789**	**$45,414**	**6,871**	**$49,598**	**7,265**	**$72,188**

Source: USDA-GATS, HS Codes: 0802909810 and 0802608000

Table 2: EU Imports of Macadamias (Kernel and In-Shell)

Suppliers	2005		2006		2007		2008		2009		2010	
	MTs	$000s	MTs	$000s	MTs	$000s	MTs	$000s	MTs	$000s	MTs	$000s
South Africa	1,481	$18,944	1,687	$17,970	2,354	$19,331	2,569	$19,848	2,713	$21,450	2,657	$28,230
Australia	1,644	$21,767	1,249	$15,619	1,972	$20,432	2,217	$20,106	1,966	$17,739	1,975	$22,618
Malawi	194	$2,127	191	$1,988	110	$919	382	$3,074	279	$2,039	343	$3,504
China	527	$6,750	297	$3,421	233	$1,902	173	$1,404	230	$1,956	292	$2,625
Kenya	150	$1,576	211	$2,170	213	$2,027	157	$1,564	222	$1,574	223	$2,057
Others	666	$8,203	457	$3,807	455	$3,581	462	$3,913	204	$1,936	403	$4,349
Total	**4,661**	**$59,366**	**4,090**	**$44,975**	**5,337**	**$48,192**	**5,961**	**$49,910**	**5,615**	**$46,695**	**5,892**	**$63,382**

Source: Eurostat, HS Codess: CN8 08029060 and 08026000

SUPPLIERS

Australia is the world's largest producer of macadamias and has seen a slight increase in kernel production from 8,000 MTs to 10,500 MTs from 2000 to 2011(INC). The country is a major supplier to the international market and exports approximately 60 to70% of its production every year. In 2010, the largest buyer of Australian macadamias was the EU at 1,975 MTs imported (kernels and in-shell). Within the EU, Belgium (825 MTs), Netherlands (549 MTs) and Germany (388 MTs) were the major buyers (Eurostat). The US was the second largest purchaser at 1,397 MTs (kernels), followed by Japan and China at 1,292 MTs and 1,063 MTs (kernels), respectively. From 2005 to 2010, Australia saw a decline in export volumes to the US and Japan, while exports to China and the EU rose. The harvesting period typically occurs from February to August, with exports generally beginning around June or July. The 2012 harvest season has seen favorable growing conditions, meaning production should be above previous seasons that suffered from poor rainfall (ABC Rural and Public Ledger 2011).

Macadamias were first introduced to **South Africa** in the 1960s and now make up one of the fastest growing tree crop industries in the country. From 2000 to 2011, South African kernel production increased from 2,375 MTs to 8,500 MTs, making the country the second largest producer in the world (INC). The industry is primarily export-based, with 95% of annual production being shipped to international markets. In 2010, China overtook the EU and US as the largest buyer of South African macadamia kernels, importing a total of 3,029 MTs, while the US imported 2,336 MTs. The EU imported 2,657 MTs worth of kernel and in-shell macadamias in 2010, with the Netherlands accounting for the bulk at 1,526 MTs (Eurostat). From 2005 to 2010, South Africa saw a net increase in export volumes to China, the EU, and the US. According to the Southern African Macadamia Growers' Association (SAMAC), the harvesting and processing period runs from February to August. The 2012 harvest season is expected to be normal due to favorable growing conditions, despite hail damage in some growing areas (Public Ledger Dec. 2011).

The **US** is the third largest producer of macadamias (kernel). From 2000 to 2011, kernel production declined from 5,400 MTs to 3,200 MTs, with South Africa surpassing the US in 2007 as the world's second largest producer. Hawaii is responsible for the majority of production. The company recorded substantial losses in 2010 due to a drought, but has rebounded in 2011 thanks to improved rainfall (Public Ledger Nov. 2011). The US imports much more than it exports; according to USDA-GATS. In 2010, the US imported 7,265 MTs worth of kernels, while exporting just 249 MTs.

Kenya is the fourth largest macadamia producer. The industry is primarily export-based with only a small amount domestically consumed. In 2010, China was the largest buyer at 2,100 MTs (INC), followed by the US at 1,498 MTs (USDA-GATS) and Vietnam at 626 MTs (INC). From 2005 to 2010, Kenya saw an increase in export volumes to all three countries despite issues regarding poor harvesting practices (e.g. early harvesting) and the illicit exportation of nuts, which are not recorded.

Reacting to rising global demand for their nuts, Kenyan farmers, particularly in Central province, are reportedly harvesting their crop prematurely in order to turn a quick profit. According to a Kenyan macadamia producer referenced in a 2011 Foodnews article, Chinese middlemen offer money in advance to farmers for their crop, which is well below market prices since middlemen, and not processors, dictate the purchasing terms. The majority of these nuts are then illegally exported through a coordinated syndicate involving foreign firms, local dealers, and clearing agents (Foodnews Dec. 2011). Kenyan shipments have been rejected in China, Japan, and India due to poor quality (quantity and time period unspecified)

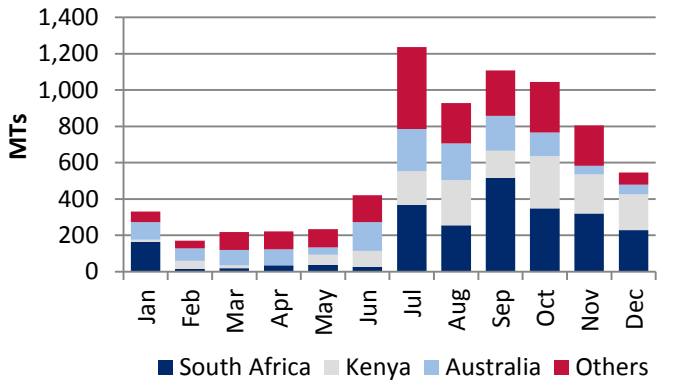
(AllAfrica Aug. 2011). To counter this trend, the Nut Processors Association of Kenya (NutPAK) and various farmers' associations agreed to harvest the nuts from March onwards, when the nuts are fully matured. In addition, in 2009, the Kenyan government banned the export of unprocessed nuts (i.e. only kernels can be exported) primarily to protect local processors from some Chinese dealers who were acting as price-setters (AllAfrica 2011). Despite these acts, the early harvesting and illegal sale of macadamia is still a major problem in Kenya. As of early 2012, Kenyan farmers were still falling prey to middlemen and receiving below market prices for their crop (Foodnews 2011). On March 5, 2012, Kenyan authorities impounded two container trucks in Nairobi on suspicion of smuggling in-shell macadamias to China.

Malawi is the fifth largest producer of macadamia kernels, as well as the fifth largest supplier to the US market. However, the country was the third largest supplier to the EU behind only South Africa and Australia. According to a Malawian industry representative, 40% of macadamia nuts are exported to the EU. One of the major producers is the UK-owned Thyolo Nut Company. Prior to 2007, the company only exported in-shell nuts but has since transitioned to kernel trade.

SEASONALITY

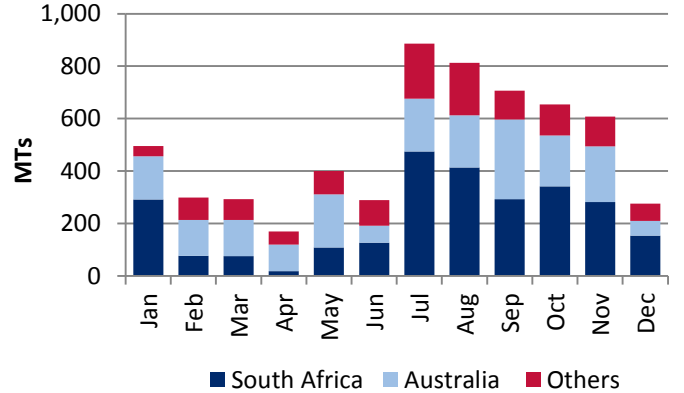
Macadamia imports into the US and EU are highly seasonal with July to November being the peak period of imports and December to June as the low months. This low period coincides with the harvesting and processing period of South Africa and Australia, which runs from February to August. For the US, the low import period is particularly pronounced since the country is able to supply itself due to a harvest season that runs from August to January (countercyclical to Australia and South Africa). In 2010, July was top month with 1,236 MTs imported by the US and 885 MTs by the EU. After July, there is a steady decline in imports until stabilizing in February.

Figure 4: US Monthly Imports of Macadamias Kernel, 2010



Source: USDA-GATS

Figure 5: EU Monthly Imports of Macadamias Kernel and In-shell, 2010



Source: Eurostat

PRICES

Macadamia kernels are priced according to size (whole, halves, chips, and powder), which are then classified under various grades or Styles. According to Australian and South African industry sources, Style 1 are premium kernels that consist of a minimum 90% whole kernel with a size range of 16 millimeter sand above (top image). Style 2 kernels are a 50/50 mixture of whole kernels and halves ranging in size from 13mm and above (middle). Style 4 kernels are a 50/50 mixture of premium halves and smaller pieces ranging in size from 9mm and 15mm (bottom). In all, the kernel grades range from Style 0 (super premium whole kernels) to Style 8 (fine chips).

Current and historical UK prices (ex-store UK[2]) for Styles 1, 2, and 4 from South Africa and Australia are available. According to the Public Ledger, UK prices for both Australian and South African grades noticeably increased from January 2008 to January 2012. Australian Style 1 prices increased from US$9,846 per MT to US$19,078 per MT (94% increase), Style 2 from US$8,861 per MT to US$18,312

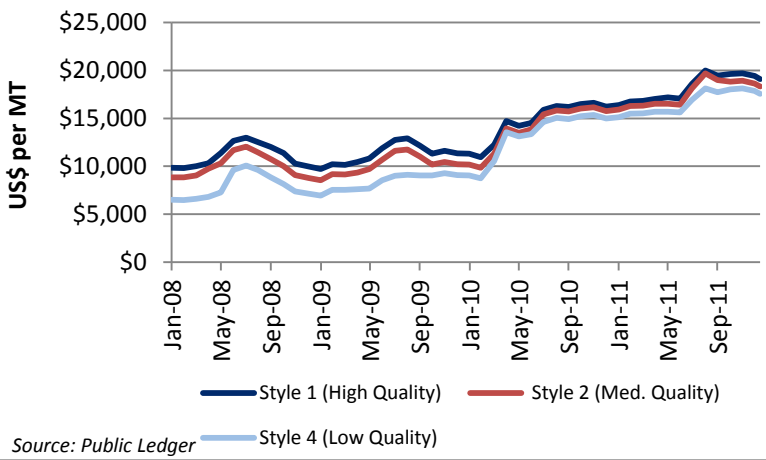
[2] "Ex store" means that the seller's only responsibility is to make the goods available at his premises (i.e. store or storage facility) (Export Insurance Services Inc. 1999). In regards to ex-store UK, these are prices for macadamias available from UK suppliers.

per MT (107% increase) and Style 4 from 6,498 per MT to US$17,546 per MT (170% increase). Over the same period, South African Style 1 prices increased from US$9,058 per MT to US$18,772 per MT (107% increase), Style 2 from US$7,876 to US$18,006 per MT (129% increase) and Style 4 from US$5,317 per MT to US$17,240 per MT (224% increase).

Overall, lower quality grades increased by higher proportions than higher quality grades. This is likely due to importers preferring to purchase lower quality grades due to their lower price. According to a UK trader, the general rising of macadamia prices over the years has caused some buyers, who may have been purchasing Style 1 and Style 2, to switch to cheaper grades such as Style 4 as a substitute (Public Ledger Sept. 2011). Cheaper grades have become increasingly scarce on the market, causing their prices to increase at a faster rate.

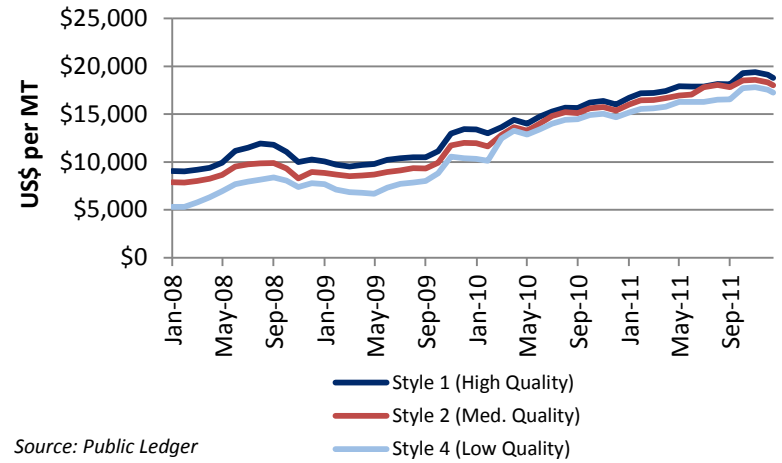
There is concern among UK traders that recent higher prices in 2011 have curtailed European demand for macadamias. According to a Dutch trader, nut roasters and industries that use macadamias as an ingredient, were losing interest and pulling back from purchases. (Public Ledger Dec. 2011) Between 2011 and 2012, prices have actually decreased from a peak in November 2011. It is unknown whether prices will continue to fall, but they are expected to remain relatively stable until August or September 2012, which is when South Africa and Australia supply their new crop. It remains to be seen how much of this new supply is bought by China, which would keep prices in Europe at their relatively high levels.

Figure 6: Prices (ex-store UK) for Australian Kernels



Source: Public Ledger

Figure 7: Prices (ex-store UK) for S. African Kernels



Source: Public Ledger

STANDARDS, LAWS AND REGULATIONS

Tariffs and Trade: According to the INC Ambassador in Hong Kong, **China** has a high import tariff of 24% for both kernel and in-shell nuts (May 2011).

US imports of in-shell macadamias have a duty rate of 1.3 cents per kg [US$13 per MT] and are not eligible for tariff preferences under the African Growth and Opportunity Act (AGOA). Imports of kernels have a duty rate of 5 cents per kilogram [US$50 per MT] and are eligible for duty free tax preferences under "Code D[3]" of AGOA (USITC).

EU imports of kernel and in-shell macadamias have a 2% general tariff rate. However, Zimbabwe qualifies for a 0% tariff rate for both forms due to the interim Economic Partnership Agreements (EPA) that were signed in August 2009.

Grades and Standards: An international standard for macadamias had not been established as of January 2012. Instead, the macadamia industry currently uses eight different styles to distinguish the size of macadamias ranging from large whole kernels through to mixes of whole and half kernels and down to just granules. According to the Southern

[3] Code D indicates AGOA GSP eligibility. http://www.agoa.gov/eligibility/product_eligibility.html

African Macadamia Growers' Association (SAMAC), in addition to size specifications, premium grades must meet certain parameters and standards[4]. A summary of kernel specifications from various industries is provided below.

Table 3: Specifications for Macadamia Kernels

Grade	Description	Measurements
Style 0	Super Premium Wholes*	> 20mm with min 95% wholes
Style 1	Premium Wholes	16-21mm with min 90% wholes
Style S1	Premium Small Wholes	13-17mm 95% wholes
Style 2	Premium Wholes and Halves	> 13mm with min 50% wholes and 50% large pieces
Style 3	Premium Cocktail Mix	> 13mm with min 15% wholes
Style 4L	Premium Halves	> 13mm with min 90% halves
Style 4S	Premium Small Halves	9-15mm with min 50% halves
Style 5	Premium Large Chips	8-13mm large chips
Style 6	Premium Chips	5-9mm chips and pieces
Style 7	Premium Small Chips	3-6mm chips
Style 8	Premium Fine Powder	Less than 4 mm

Sources: Australian Macadamia Society (AMS), Australian Macadamia, Southern African Macadamia Growers' Association (SAMAC)
**Whole kernels are kernels which are not split or separated into halves, with not more than 25% of the kernel missing*

In addition to product specification, suppliers must meet certain safety requirements stipulated by the *Codex Alimentarius*[5], which acts as a global reference point for consumers, food producers and processors, national food control agencies and the international food trade. Many countries default to the Maximum Residue Limits (MRLs) established by the Codex, which lists the insecticides *methidathion* 0.01 mg/kg and *endosulfan* 0.02 mg/kg as the MRLs for macadamia nuts (Codex, FAO/WHO). Although **Hong Kong** defers to the Codex, mainland **China** officially does not. However, China does annually host the Codex Committee on Pesticide Residues (CCPR), and during the 2007 CCPR meeting China stated that it will consider Codex MRLs in cases where there is a residue dispute on specific shipments (USDA Foreign Agricultural Service Dec. 2011[6]).

The **US** and **EU** MRL standards are slightly different than the Codex and includes a longer list of regulated pesticides. The MRLs for the US are *methidathion* 0.05 mg/kg and *endosulfan* 0.2 mg/kg, while the EU has *methidathion* 0.05 mg/kg and *endosulfan* 0.1 mg/kg. For a full list of US and EU regulations, please refer to the US Pesticide MRL Database[7] and the EU Pesticides Database[8].

Processing companies that produce for the international market must meet Hazard Analysis and Critical Control Point Analysis System (HACCP[9]) requirements for receiving, processing, packing, supply and export of macadamia nuts.

Postharvest Handling and Processing: According to industry sources, macadamias are typically harvested (manually or mechanically) from the ground when they are fully mature. Within 24 hours of harvesting, the nuts are dehusked in order to reduce the risk of kernel deterioration due to respiration. After de-husking, the nuts are washed and placed in drying bins for about six to eight weeks, reducing the kernels' moisture content from approximately 25 to 1.5%. The moisture reduction shrinks the kernel and allows for the cracking of the shells without breaking the valuable nut inside. Machines

[4] Macadamia product quality specifications: Premium grade kernels: http://www.samac.org.za/docs/QualityStandardsTable1.pdf
[5] FAO/WHO Food Standards: CODEX http://www.codexalimentarius.net/pestres/data/index.html
[6] China Pesticide MRLs Market Information Page http://www.mrldatabase.com/marketinfo/marketinfo_332_6081291112023803.pdf
[7] FAS Online, US MRL database http://www.mrldatabase.com/
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[9] Examples Kenyan and Malawian HACCP accreditation are available at http://www.kenyanut.com/downloads/knc_certification.pdf and http://www.thyolonut.com/Standards.shtm

are often employed and designed to make sure that this process happens efficiently. The kernel and the shell are then separated through a variety of techniques, with the kernels undergoing a grading process. Shelled kernels deteriorate rather quickly unless kept in vacuum-sealed jars. Processed nuts keep well when they have been roasted and salted.

Packaging: The Australian Macadamia Society (AMS[10]) recommends the following materials be used in the retail packaging of macadamia kernel (raw, roasted, honey roasted, etc.):

- Hermetically sealed metal cans or glass jars.
- High barrier flexible packaging (aluminum foil laminate as opposed to polythene or cellophane bags)

Macadamia kernels can easily deteriorate and require a storage environment low in moisture and oxygen. Ideally this is achieved by a combination of gas flushing with food grade carbon dioxide or nitrogen, and partial "vacuumizing" before hermetically sealing the packaging (AMS). The Kenya Nut Company noted that their kernels are vacuum-flushed and filled with carbon dioxide gas prior to sealing up in 5, 11.34, or 20 kilogram flexible bags.

OUTLOOK

As of early 2012, the macadamia market remains strong for both producers and processors due to rising imports from Asia and stable demand from US and EU markets. From 2006 to 2010, worldwide imports of macadamia kernels increased from 17,080 MTs to 30,798 MTs (80% increase), with China, US, and the EU as the top markets (INC, USDA-GATS, Eurostat). Taken as a whole, Chinese, US, and EU kernel imports accounted for 67% of the global import share in terms of volume in 2010. China is of particular importance to the global trade in macadamia as its global import share increased from 5 to 24% over the six-year period, eclipsing the US (23%) and EU (19%) in 2010 as the top buyer of kernels. China's growing influence in the market is likely to continue into 2012 in line with the country's economic growth.

To satisfy the world's increasing appetite for macadamia nut, African countries such as South Africa, Kenya, and Malawi have stepped up production. In 2007, South Africa surpassed the US as the world's number two kernel producer, while Kenya and Malawi tripled kernel production from 2001 to 2011. South Africa and Kenya are also expected to have an adequate 2012 harvest, while Malawi may record a slight decline due to a drought in late 2011. Australia, also a top kernel producer, is expected to have an average 2012 harvest after a disappointing 2011 harvest due to poor rainfall. Despite the generally positive 2012 crop outlook and increased production from Africa, supply is tight and will likely remain so over the coming years.

While China is the leading importer of macadamia, other countries such as Vietnam, South Korea, and Taiwan are showing increased interest for the nut. The EU and US will remain an attractive market for exporters, but opportunities for growth are limited.

Due to rising demand and limited supply, kernel prices have increased dramatically since 2008. UK prices for both Australian and South African kernels have increased from January 2008 to January 2012, with lower quality grades recording higher proportional price increases than higher quality grades (Public Ledger). According to a UK trader interviewed for this report, the general price increase in recent years has caused some buyers to substitute with cheaper grades. These lower quality grades are increasingly scarce, driving up prices for this segment. Eventually, prices are expected to plateau and stabilize. As of March 2012, prices for all grades had not significantly increased since September 2011. However, prices are likely to remain relatively high and supply tight throughout 2012 due to Asian demand.

[10] The Australian Macadamia Society is the top body representing the Australian Macadamia industry. It is a body of approximately 800 Australian and 30 overseas members representing all facets of the macadamia industry in Australia.

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